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PROMOTION OF SMALL- AND MEDIUM-SCALE ENTERPRISES WITH SPECIAL EMPHASIS ON ADEQUATE TECHNOLOGIES, TRAINING AND REGIONAL COOPERATION

Issue Paper 2*

Prepared by

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I. The animal feed factory and its market

1. Animal feed production plants like many manufacturing facilities in principle show economies of scale. The production capacity, however, depends on the market demand which, in turn, influences the technological production process and the type and variety of the feedstuff to be produced. Consequently, this should be one of the major considerations when planning commercial animal feed production factories.

2. As mentioned, large-scale production of animal feed compounds is clearly guided by market demand. A great variety of animal feed products are produced in developed countries tailored to the needs of the various animals such as monogastric animals, ruminants, poultry, young animals and mature animals. A large market doubtlessly exists in developed countries and the market-oriented approach of large scale animal feed production plants is clearly visible.

3. Small- and medium-scale animal feed factories are generally geared to meet local market demands. They have often been established in order to produce the feedstuff needed by one or two specific animal farms. The feed product is clearly defined to fit the demands of the user and since this relationship is well established, modifications in the production market thereof are required. The animal feed factory and the connected animal farms may form one integrated unit to be operated under one and the same management.

4. Small- and medium-scale plants are most suitable for the purpose of starting production in the animal feed sector. Their small scale reduces the production risks and gives them a certain production security if they are able to secure their own limited but steady market. Small-scale factories are usually in a position to grow along with their market.

5. The situation is characterized by the fact that development or modernization by the users is dependent on an unknown regular supply of compound feedstuff, and investments by potential feed producers dependent on a non-existent animal feed market. It appears to be a vicious circle. Who is to start action and how should it be started.

II. The production process

6. The technological process of animal feed production is relatively simple and does not require technically sophisticated equipment and machinery. In small-scale factories, batch operations are the rule but the higher the production scale the more mechanization is required. Mechanization and automation, however, are only useful and effective in connection with continuous operations.

7. In large-scale factories, the production process is generally computerized. It reduces production costs and automatically controls the composition of the final feed product

by regulating the quantity and type of the various feed ingredients to be blended and compounded. It should, however, be clearly understood that independently from the scale of production, constant quality controls of feed ingredients and the final feed product are essential activities.

8. Raw materials/ingredients normally enter the factory packed in sacks. They have to be weighed and the material has to be analysed to define its composition. The various ingredients are stored in storehouses (sack storage), bins or silos. In small-scale operations provision for cleaning or final drying is not normally made; this makes quality control particularly important.

9. From the storage bins/silos/warehouses the ingredients are transported to the grinding section which normally consists of impact grinders (hammer mills) with perforated screens. In small-scale factories the transport may be done manually although the use of mechanical transport elements may prove to be beneficial.

10. The ground materials are then blended normally by using bin discharge systems. In small-scale factories blending may be made in batch operations. Blending means the measuring and mixing of the required quantities of ingredients to form a uniform final product. Intensive mixing is important and is usually also made in batch operations in small-scale factories.

11. The ground, blended and mixed feed may have to be pelleted in order to reduce volume and to make the intake easier for poultry. For the pelleting process a steam boiler is required also in small-scale factories. Water is needed for steam generation and electric power is essential for the operation of the factory.

Considerations

12. The animal feed compound production technology is in principle, well defined and has proved itself in practical operations. However, a technology has to meet specific operating conditions which may be different from country to country. The climate may play a role, as well as salaries and wages, cost and price structures, energy and water supplies, raw material preparation requirements, bagging and storage, etc. Even a well conceived technology, the usefulness of which has already been proved to be effective, needs to be adapted to prevailing local conditions in order to be efficient.

13. A developing animal feed industry expected to use local, non-traditional raw materials for the production of quality compound feed requires more than the commonly known processing technology. Special processes may have to be developed for industrial application which have to meet the specific requirements of the unusual raw material to be processed. The utilization of local uncommon feed raw materials/ingredients by the animal feed industry in developing countries will, therefore,

have to go along with the development of the most effective technology.

14. The Consultation may, therefore, wish to consider the technology development requirements of a growing animal feed industry, especially in regard to its adaptation for the utilization of non-traditional raw materials. It may also wish to outline measures to be taken by national and regional research institutes and by policy-makers in support of technology development action.

III. The scale of production

15. Next to the market demand and the raw material/feed ingredient supply situation, the scale of production is determined according to the availability of suitable equipment. The equipment has to be specifically designed and should permit the production of quality feedstuff at the lowest possible production costs.

16. Small-scale may start with a capacity of 250 - 300 kg per hour of straw mix plant for all types of straw/stalks (see ID/WG.529/1 (SPEC.)). A large variety of equipment exists with a capacity below 1 ton per hour. Experience in some African countries (see the case of Senegal) shows that with present demand, a production capacity of 15 tons an hour may be far beyond the needs of a country and that plants of that size have to be designed to serve the broader subregional market.

IV. The equipment

17. As already mentioned above the scale of production is dependent on suitable available equipment. This particularly refers to small-scale factories. The equipment for small- and medium-scale operations should be as simple as possible but it has to be suitable.

18. The equipment for small- and medium-scale factories can and should be locally manufactured. Provisions should, therefore, be made by local engineering companies and mechanical workshops for the preparation and/or procurement of designs and drawings for this purpose. Manufacturing licenses may be obtained from competent and experienced national or international engineering companies if required as well as relevant manufacturing know-how.

Considerations

19. Reputable equipment producers in industrialized countries offer a great variety of equipment for the animal feed industry. This equipment is certainly well designed and fabricated. However, in most cases the price is too high and the foreign exchange requirements too many. Also, very often equipment designs have been made to meet the needs of developed countries with higher capacity demands and do not always correspond to the requirements prevailing in developing countries. In addition,

equipment for processing non-conventional raw materials may not be available.

20. There are, therefore, not only economic reasons for attaching priority to local manufacturing of equipment in developing countries, it is also important to have in-depth knowledge of the conditions under which the equipment has to be operated. Certain smaller or bigger modifications and adaptations to local conditions will become necessary. It should be noted that most of the equipment and machinery required by the animal feed industry is not specific for this sector but may well be used for other agro/food processing operations involving milling, mixing, pelleting, etc..

21. When considering the need for local fabrication of equipment and machinery for the production of animal feed compounds, the Consultation may wish to discuss action to be taken to this effect. Existing capital goods industries in the region will have to be strengthened to facilitate the design and fabrication of relevant equipment and machinery and spare parts and to provide repair and maintenance services in line with the requirements of the animal feed production industry.

V. Quality control

22. It has already been pointed out in this paper as well as in Issue Paper No. 1, that quality control is of great importance for feed production operations. This also refers to small- and medium-scale production plants. Quality controls may, however, cause a serious problem to small-scale feed producers because of the need for laboratory facilities and trained staff. These requirements may cause considerable additional costs which a small-scale factory may not be in a position to afford. Essential quality control services may, therefore, best be obtained from public or private institutions, universities or research laboratories.

23. Another problem for small-scale animal feed factories may be the purchase and use of feed supplements in the appropriate quantity and quality. This refers especially to vitamins and minerals. Small-scale feed producers may, therefore, wish to order the necessary feed supplements in the form of pre-mixes from relevant international commercial companies through appropriate channels.

VI. Storage and pest controls

24. Storage of raw materials/ingredients and final products is certainly a cost factor, but more than expenses are at stake. Storage has to prevent pests and mould which affect quality and presents health hazards for animals and human beings.

25. The problem may start with the raw materials. Sun-dried substances may introduce pathogenic bacteria or insect eggs which may not have been noticed. The outside air may introduce organic substances which affect the quality of the stored materials.

Insufficient air ventilation may encourage nest building and cause overheating of the material stored in bins or silos which could even cause self-ignition and consequently fire.

26. In this context aflatoxin intoxification may also play a role. The toxic mould "aflatoxin" affects the quality of a feed product or ingredient with a negative effect on the health of the animals fed with feedstuff containing aflatoxin. Aflatoxin can develop on insufficiently dried materials in a moist atmosphere which often occurs in tropical countries during the rainy season.

27. Again, the need for constant quality control activities becomes evident. Not only the quality and composition of the incoming raw materials has to be determined but also their possible intoxification upon arrival at the factory, and constant controls are advisable during storage times. The longer the storage time, the more necessary become the controls. This sounds complicated to small-scale animal feed producers but it is only part of the normal precautionary exercise of responsible animal feed producers.

Considerations

28. The Consultation may wish to discuss measures for quality and pest control for this type of industry, specifically for small- and medium-scale enterprises, within the framework of existing research institutes.

VII. Village-scale animal feed manufacture

29. While small- and medium-scale animal feed production activities are industrial operations bound to follow industrial principles of production and marketing, village-scale manufacturing is a different issue with different criteria. Village-scale animal feed manufacturing may, however, become relevant for communities living in remote areas with no access to animal feed markets.

30. In village-scale operations, scientifically formulated compound animal feed is not normally required. It just means the conservation of feed material which may be abundantly available over a larger or shorter period but may - for many reasons - not be available when needed, namely during dry periods. One single dry period may cause starvation and even death of the animals, which could have disastrous effects on human life.

31. It may, therefore, be important to manufacture mixed feed from available materials such as oil cakes, cassava, grass, fruit residues, etc., by drying, shredding and mixing at times when they are available for times when animal feed becomes scarce.

32. Simple local tools will be required as well as practical advice and basic information on the requirements of animal feed. In principle the manufacturing process is very similar to industrial small-scale operations performed in a simple artisanal way. It alsc means shredding, drying, blending and mixing of the

various available materials to produce a mixture with the best possible feed value. Rural communities might have better survived the recent dry periods affecting the Sahel Zone together with their animals if they had been able to draw on stored artisanal animal feedstuff.

33. Artisanal animal feed manufacturing is not an industrial activity and the question of feasibility cannot be raised in this context. The manufacturers will often become the users of the feed mixes produced. Village-scale production should be seen as a social, self-supporting activity with a considerable impact on rural development. Many authorities have successfully introduced specific rural development policies. The artisanal production of feedstuff should form part of it.

Considerations

34. When discussing village-scale animal feed material conservation and artisanal mixed feed production, the Consultation may wish to acknowledge the benefits to be obtained therefrom for rural communities. Chapter VIII of this paper refers. In this context the Consultation may wish to recommend that relevant information be provided to rural communities to this effect and that in rural development policies priority be attached to the artisanal production of mixed animal feed using locally-available raw materials.

VIII. Training requirements

35. The provision of information material to animal feed producers is very important (Issue Paper No. 1 refers) but written information cannot replace practical training of workers and staff of a factory. Many training courses are being conducted covering a great variety of industrial operations but training in the animal feed production sector has been widely neglected. The reason for this may be the general underestimation of its importance.

36. Training has to be adequate and should be carried out in a practical way. Training courses would best be conducted directly in small-scale factories so that the practical handling of materials and the operation and servicing of machinery and equipment is demonstrated. Many training centres exist in a number of developing countries to which those for animal feed production may be added. Training facilities may also be established within the framework of research institutes, preferably in connection with pilot plant operations, which in addition to research and testing work may also be used for training purposes.

Considerations

37. The Consultation may wish to discuss the need for including relevant training courses in the overall training programme of existing training institutions.